IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method for determining sensor response in an interferometric sensor system comprising:

generating an interrogation signal for an interferometric sensor array, where the interrogation signal comprises a plurality of pulses;

switching a polarization of ~~each~~ one pulse in each successive pulse pair defined by the plurality of pulses to create at least four different pulse pairs~~, where the polarization is switched between pulses~~;

receiving a responsive signal from at least one sensor within the interferometric sensor array comprising at least four independent signal components carrying information about a system response matrix associated with each of the at least one sensors; and

extracting information from the at least four independent signal components concerning a Jones Matrix of a sensor.

2. (Original) The method of claim 1 wherein the plurality of pulses comprises at least one pulse pair and the polarization is switched between the pulses in the at least one pulse pair.

3. (Original) The method of claim 1 further comprising determining a common mode phase response of the sensor.

4. (Original) The method of claim 1 further comprising determining a differential birefringent response of the sensor.

5. (Original) The method of claim 1 wherein the interrogation signal has a varying optical frequency.

6. (Original) The method of claim 2 wherein the at least one pulse pair comprises a first pulse and a second pulse, where a separation of an end of the first pulse to a beginning of the second pulse is less than the interferometric delay of the sensor.

7. (Original) The method of claim 1 wherein the polarization is switched between orthogonal polarization states.

8. (Original) The method of claim 2 wherein the polarization is switched between orthogonal polarization states and the at least one pulse pairs has a unique combination of polarization states.

9. (Original) The method of claim 2 wherein the polarization of each pulse in the at least one pulse pair comprises a combination of two components of orthogonal polarization states.

10. (Original) The method of claim 9 wherein the combination is time varying and individually controlled for each pulse.

11. (Original) The method of claim 9 wherein the phase of each of the two components is modulated.

12. (Original) The method of claim 11 further comprising filtering the reflected signal to produce separated signals that comprise information about the system response matrix associated with each of the at least one sensors.

13. (Original) The method of claim 11 further comprising modulating each component using a different linear rate to form at least four separable signal components.

14. (Original) A method for determining sensor response in an interferometric sensor system comprising:

producing an interrogation signal comprising polarization states that are defined by one or more linearly independent transmitted Stokes vectors;

applying the interrogation signal to an interferometric sensor array;

receiving a responsive signal from at least one sensor within the interferometric sensor array using a plurality of receiver channels that project the responsive signal onto one or more linearly independent receiver Stokes vectors; and

extracting a multiple of extracted signal components representing different combinations of the one or more linearly independent transmitted Stokes vectors and the one or more linearly independent receiver Stokes vectors;

where the multiple of extracted signal components form a total number of signal components that comprise information about a system response matrix associated with the at least one sensor and enable the extraction of information regarding a Jones Matrix of the at least one sensor.

15. (Original) The method of claim 14 wherein the signal components comprise linearly independent transmitted Stokes vectors.

16. (Original) The method of claim 14 wherein the product of the total number of transmitted polarization states and the total number of receiver channels is at least four.

17. (Original) The method of claim 14 wherein at least one linear combination of the linearly independent transmitted Stokes vectors provides a Stokes vector that represents a depolarized polarization state and the total number of receiver channels is at least four.

18. (Original) The method of claim 17 wherein the interrogation signal comprises at least one depolarized polarization state.

19. (Original) The method of claim 14 wherein at least one linear combination of the linearly independent receiver Stokes vectors provides a Stokes vector that represents

an unpolarized receiver channel and a total number of linearly independent transmitted Stokes vectors is at least four.

20. (Original) The method of claim 14 wherein the total number of linearly independent transmitted Stokes vectors is at least two and the total number of linearly independent receiver Stokes vectors is at least two, and the product of the total number of linearly independent transmitted Stokes vectors and the total number of linearly independent receiver Stokes vectors is at least six.

21. (Original) The method of claim 14 wherein a state of polarization of the interrogation signal is modulated between one or more transmitted polarization states.

22. (Original) The method of claim 21 wherein the modulation is at least one of continuous and step-wise.

23. (Original) The method of claim 14 wherein the receiver comprises one or more detectors, the outputs from each of the one or more detectors defining a receiver channel.

24. (Original) The method of claim 14 wherein the receiving step further comprises detecting components of the responsive signals projected onto a varying state of polarization that is modulated between polarization states defined by the linearly independent receiver Stokes vectors.

25. (Original) The method of claim 24 wherein the modulation is at least one of continuous and step-wise.

26. (Original) The method of claim 14 wherein the extracting step further comprises separating signal components in the frequency domain.

27. (Original) The method of claim 14 wherein the extracting step further comprises separating signal components in the time domain.

28. (Original) The method of claim 14 wherein the producing step further comprising generating at least one pulse pair.

29. (Original) The method of claim 28 further comprising switching a polarization between the pulses in the at least one pulse pair.

30. (Original) The method of claim 14 further comprising determining a common mode phase response of the sensor.

31. (Original) The method of claim 14 further comprising determining a differential birefringent response of the sensor.

32. (Original) The method of claim 14 wherein the interrogation signal has a varying optical frequency.

33. (Original) The method of claim 32 further comprising determining a common mode delay response of the sensor.

34. (Original) The method of claim 32 further comprising determining a differential birefringent delay response of the sensor.

35. (Original) The method of claim 28 wherein the at least one pulse pair comprises a first pulse and a second pulse, where a separation of an end of the first pulse to a beginning of the second pulse is less than a interferometric delay of the sensor.

36. (Original) The method of claim 29 wherein the polarization is switched between orthogonal polarization states.

37. (Original) The method of claim 36 wherein the polarization is switched between orthogonal polarization states and the at least one pulse pairs has a unique combination of polarization states.

38. (Original) The method of claim 29 wherein the polarization of each pulse in the at least one pulse pair comprises a combination of two components of orthogonal polarization states.

39. (Original) The method of claim 38 wherein the combination is time varying and individually controlled for each pulse.

40. (Original) The method of claim 38 wherein the phase of each of the two components is modulated.

41. (Original) The method of claim 40 further comprising filtering the reflected signal to produce the one or more additional signal components.

42. (Original) The method of claim 41 further comprising modulating each component using a different linear rate to form at least four separable signal components.

43. (Original) A method for determining sensor phase in an interferometric sensor system comprising:

producing an interrogation signal for an interferometric sensor array, where the interrogation signal defines at least four independent Stokes vectors;

applying the interrogation signal to an interferometric sensor array having at least one sensor;

receiving a responsive signal from the interferometric sensor array; and

computing a Jones matrix for the at least one sensor in said interferometric sensor array in response to the responsive signal.

44. (Original) The method of claim 43 wherein the producing step comprises:

modulating a state of polarization of an optical signal along a predefined path on the Poincaré' sphere to produce the interrogation signal;

45. (Original) The method of claim 43 wherein the at least four independent Stokes vectors are produced by modulating the interrogation signal using at least one of phase modulation, polarization modulation and frequency modulation.

46. (Original) The method of claim 45 wherein the modulation is at least one of continuous and step-wise.

47. (Original) A method for determining sensor phase delay in an interferometric sensor system comprising:

generating an interrogation signal for an interferometric sensor array having at least one sensor, where the interrogation signal is depolarized;

receiving a responsive signal from the interferometric sensor array using a polarization diversity receiver to separate the responsive signal into a plurality of polarization components; and

extracting from the plurality of polarization components information concerning a Jones matrix for the at least one sensor.

48. (Original) The method of claim 47 wherein the plurality of polarization components comprise horizontal, vertical, right circular, left circular, 45 degree and –45 degree.

49. (Original) The method of claim 47 wherein the interrogation signal is a frequency swept signal and the sensor array is an imbalanced array.

50-61. (Canceled)

62. (Previously Presented) An apparatus for determining sensor phase delay in an interferometric sensor system, comprising:

a source for generating an interrogation signal for an interferometric sensor array having at least one sensor, where the interrogation signal is depolarized;

a polarization diversity receiver for receiving a responsive signal from the interferometric sensor array and separating the responsive signal into a plurality of polarization components; and

a processor for extracting from the plurality of polarization components information concerning a Jones matrix for the at least one sensor.

63. (Currently Amended) An apparatus for determining sensor response in an interferometric sensor system, comprising:

means for generating an interrogation signal for an interferometric sensor array, where the interrogation signal comprises a plurality of pulses;

means for switching a polarization of ~~each~~ one pulse in each successive pulse pair defined by the plurality of pulses to create at least four different pulse pairs~~, where the polarization is switched between pulses~~;

means for receiving a responsive signal from at least one sensor within the interferometric sensor array comprising at least four independent signal components carrying information about a system response matrix associated with each of the at least one sensors; and

means for extracting information from the at least four independent signal components concerning a Jones Matrix of a sensor.

64. (Previously Presented) An apparatus for determining sensor phase in an interferometric sensor system, comprising:

an interferometric sensor array having at least one sensor;

a source for producing an interrogation signal for applying to the interferometric sensor array, wherein the interrogation signal defines at least four independent Stokes vectors;

a receiver for receiving a responsive signal from the interferometric sensor array; and

a processor for computing a Jones matrix for the at least one sensor in said interferometric sensor array in response to the responsive signal.